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(56) Documents Cited

GB 1139169 A US 5422459 A US 4778977 A
US 3953923 A

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(54) Mounting carrier for heating elements

(57) A sheathed heating element 12 is mounted to the base of a liquid heating vessel 24 in an extruded aluminium carrier 14 bent into an annular shape and attached to the base of the vessel. The element 12 is retained in the carrier by folding the tops of the side walls 10 over the element.

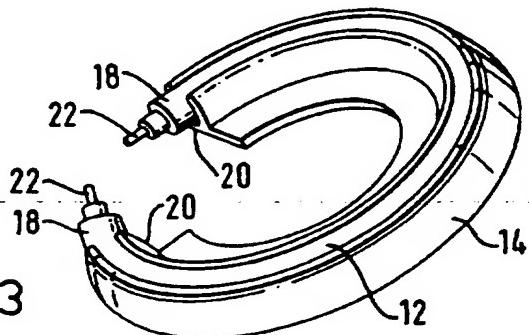


FIG. 3

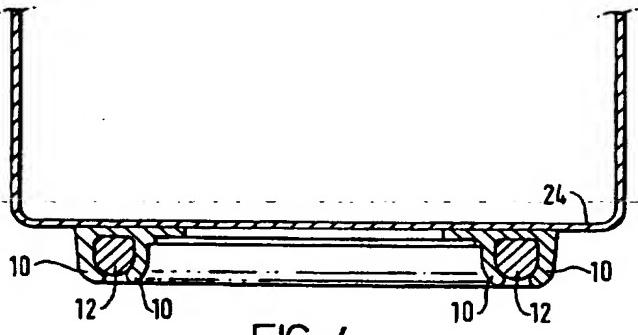
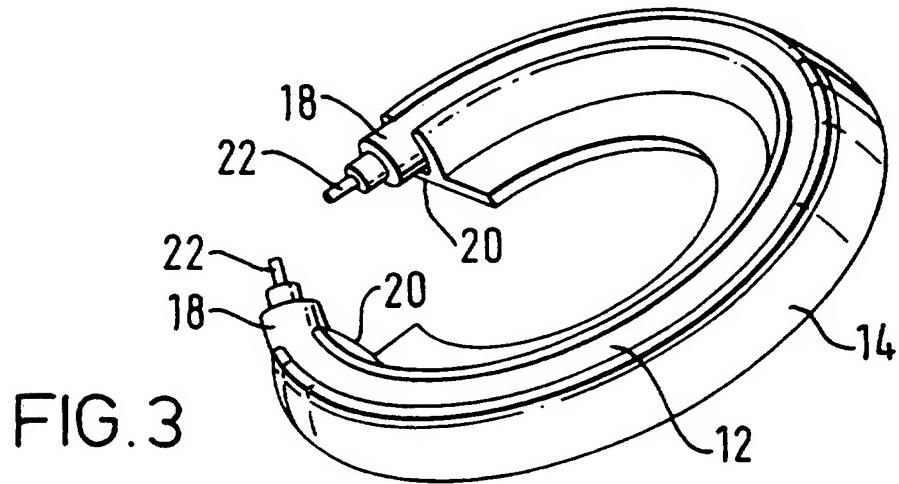
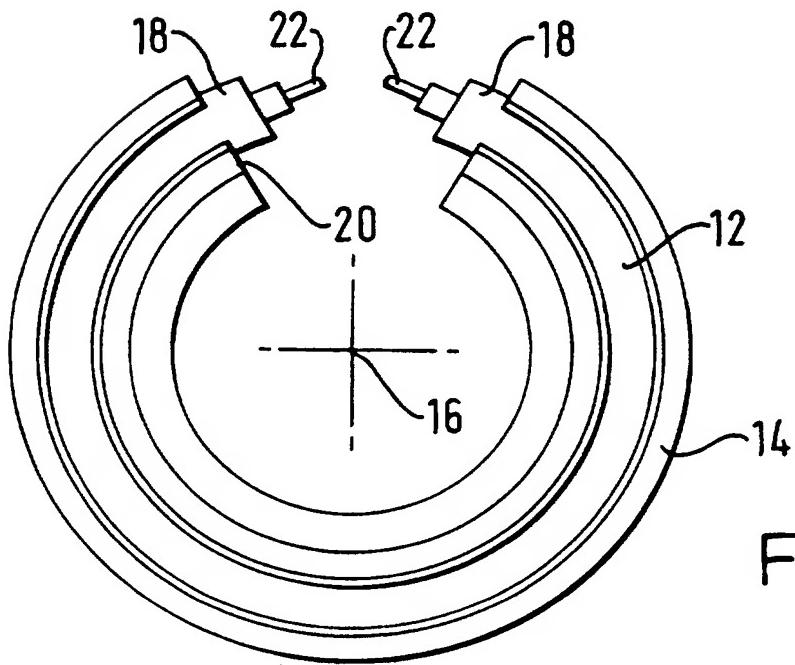
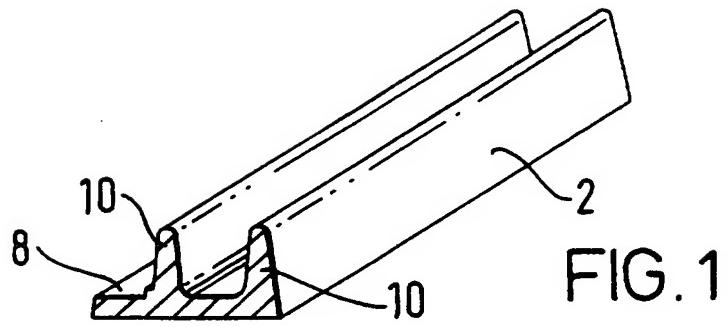


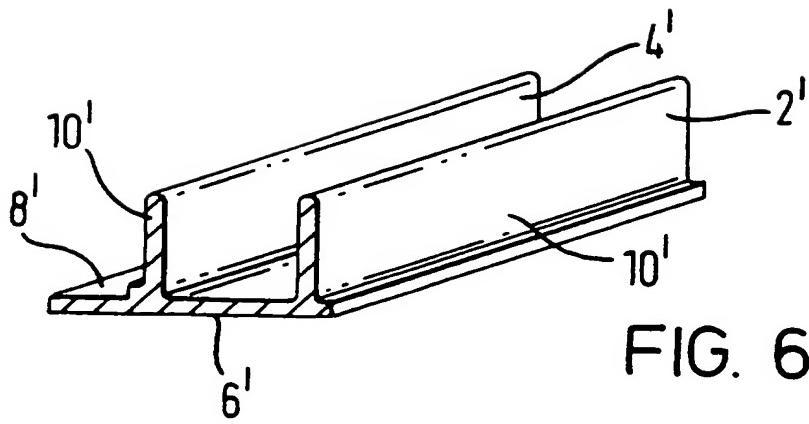
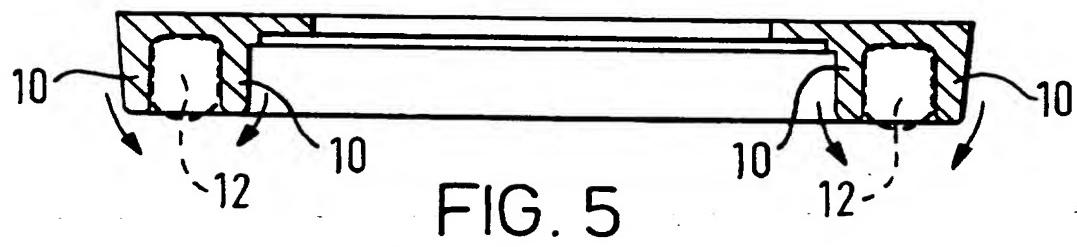
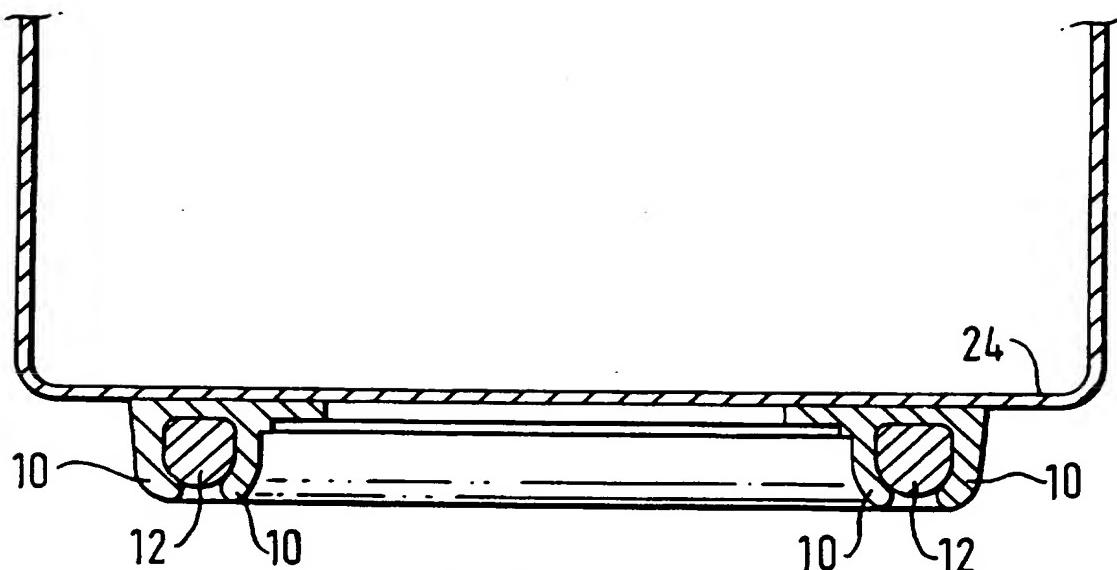
FIG. 4

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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Liquid Heating Vessels

5 The present invention relates to liquid heating vessels, and in particular to the mounting of electric heating elements to the underside of the base of such vessels.

10 Traditionally water for beverages, for example, has been heated in kettles and jugs with immersion heaters arranged inside a lower part of the kettle or jug. However, it is now becoming more common to provide water heating vessels in which a heating element is mounted to the underside of a vessel base, leaving the interior of 15 the vessel empty, for cleaning purposes. Typically the vessel is of stainless steel and a metal sheathed heating element is mounted to the underside of the base in a thermally conductive aluminium or aluminium alloy carrier plate or ring which is brazed or otherwise joined to the base.

20 In one known construction, an aluminium plate is soldered across the underside of the vessel base and a heating element wrapped in steel wire is pressed into the plate to retain it in position. However this is 25 very wasteful of aluminium and is therefore expensive. It has also been proposed, for example in our earlier application WO 95/34188, to use an aluminium ring as a carrier for the element, in order to reduce the amount of metal used. However, it is still expensive to cast 30 or hob an annular carrier.

35 The present invention provides, from a first aspect, a liquid heating vessel having an electric heating element secured to the underside of the base of said vessel in an extruded, thermally conductive, carrier.

From a second aspect the invention also provides an electric heating element assembly mounted to, or for mounting to, the underside of the base of a liquid heating vessel, comprising an electrical heating element

mounted in an extruded, thermally conductive, carrier.

From a third aspect the invention provides a method of mounting an electrical heating element to the underside of the base of a liquid heating vessel comprising mounting the element in a thermally conductive, extruded, carrier mounted to or for mounting to the said base.

From a fourth aspect, the invention provides an elongate, extruded, thermally conductive, carrier for an electrical heating element.

Thus in accordance with the invention, an electrical heating element is mounted in an extruded carrier. By extruding a carrier, and bending it as required to an appropriate shape, considerable material and production costs can be achieved.

Preferably therefore the carrier is extruded through an appropriately shaped die as a continuous length, cut to length and if appropriate bent to a desired shape. Preferably the extruded section is generally U-shaped, having a flat bottom for location against the underside of the heating vessel and two upstanding arms defining a channel into which the element may be inserted. Most preferably the element is secured within the carrier by folding the tops of the channel legs over the upper sides of the element. Alternatively or additionally, the element may be bonded in the channel using a suitable bonding material. The tops of the channel legs may be brazed or soldered over to completely enclose the heating element in the channel.

The carrier is preferably substantially annular, but need not extend 360° around its axis. Indeed preferably, the carrier extends around 270°-330°, most preferably around 300°, to leave sufficient space at its opposed ends for the cold pins of the element to protrude for connection to an electrical supply.

The carrier is preferably of aluminium or aluminium

alloy. This has the advantages that such materials are highly thermally conductive, are easily extruded and are ductile so that they may easily be bent into a desired shape.

5 The element may be mounted in the carrier either before, after, or at the same time as the carrier is attached to the vessel base. In the presently envisaged embodiment, the carrier is first mounted to the vessel base for a member which will form the vessel base, and
10 the element then inserted and secured in the carrier. The carrier may be attached to the base by any suitable method for example friction welding or soldering.

15 Some preferred embodiments of the invention will now be described with reference to the accompanying drawings in which:

Fig. 1 shows a length of extrusion for use in the invention;

Fig. 2 is a plan view of an element assembly according to the invention;

20 Fig. 3 is a perspective view of the assembly of Fig. 1;

Fig. 4 shows the assembly of Figs. 1 and 2 mounted to the underside of the base of a liquid heating vessel;

25 Fig. 5 shows a vertical section through the extrusion of Fig. 1, bent into its final form; and

Fig. 6 shows an alternative form of extrusion for use in the invention.

With reference to Figs. 1 to 5, a carrier for an electric heating element is constructed from an extruded length 2 of aluminium or aluminium alloy. The extrusion 2 is generally U-shaped, having a channel portion 4, a base portion 6 and a flange 8. The channel 4 has a pair of walls 10 and is for receiving a conventional metal sheathed heating element 12, as shown in Figs. 2 to 5.

35 As can be seen from Figs. 2 and 3, the extrusion 2 is bent to form a carrier 14 which is substantially annular, extending approximately 300° about its axis 16.

The ends 18 of the element 12, when fixed in the carrier extend from the opposed edges 20 of the carrier, to allow the cold tails 22 of the element to connect to an electrical supply (not shown). The bending of the 5 extrusion 2 is carried out in such a way as to maintain the base portion 6 thereof substantially flat, for attachment to a vessel base 24, as shown in Fig. 4.

The extrusion 2 is preferably bent to its annular form (shown in section in Fig. 2) before the element 12 10 is inserted, since the element 12 may be harder to bend than the extrusion 4, thereby complicating the bending procedure.

After bending, and preferably before insertion of the element 12, the carrier 14 is attached to the vessel 15 base 24 which is preferably stainless steel. This may be achieved in a number of ways. For example the carrier could be soldered on to the base 24 under pressure using an appropriate solder and flux, or could be attached by some other fusion process. Alternatively 20 the vessel base 24 may be provided with a keying profile into which the base portion 6 of the carrier 14 may be pressed.

The element 12 is secured in the channel 4 of the carrier by rolling or folding over the tops of the legs 25 10 of the channel 4, as shown schematically in Figs. 2 and 4. The element 12 may be secured in the carrier 14 during the same pressing operation as that which attaches the carrier 14 to the base 24 or either before or after that operation.

Fig. 6 shows a second length of extrusion 2' which 30 can be used in the invention. This is to be preferred to the above described embodiment in that its section thickness are less, making it easier to fabricate and using less material.

1. A liquid heating vessel having an electric heating element secured to the underside of the base of said vessel in an extruded, thermally conductive, carrier.
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2. An electric heating element assembly mounted to, or for mounting to, the underside of the base of a liquid heating vessel, comprising an electrical heating element mounted in an extruded, thermally conductive, carrier.
10
3. An elongate, extruded, thermally conductive, carrier for an electrical heating element.
- 15 4. Apparatus as claimed in any preceding claim wherein the carrier is generally U-shaped in section, having a flat bottom for location against the underside of the heating vessel and two upstanding arms defining a channel into which the element may be inserted.
- 20 5. Apparatus as claimed in claim 5 wherein the element is secured within the carrier by folding the tops of the channel legs over the upper sides of the element.
- 25 6. Apparatus as claimed in any preceding claim wherein the carrier is substantially annular.
7. Apparatus as claimed in claim 6 wherein the carrier extends 270° -330° around its axis.
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8. Apparatus as claimed in claim 7 wherein the carrier extends about 300° around its axis.
- 35 9. Apparatus as claimed in any preceding claim wherein the carrier is of aluminium or aluminium alloy.
10. A method of mounting an electrical heating element to the underside of the base of a liquid heating vessel comprising mounting the element in a thermally

conductive, extruded, carrier mounted to or for mounting to the said base.

5 11. A method as claimed in claim 10 wherein said carrier is a carrier as claimed in claims 3 to 9.

10 12. A method as claimed in claim 10 or 11 wherein the carrier is first mounted to the vessel base or a member which will form the vessel base, and the element then inserted and secured in the carrier.

15 13. A liquid heating vessel substantially as hereinbefore described with reference to the accompanying drawings.

14. An electric heating element assembly substantially as hereinbefore described with reference to the accompanying drawings.

20 15. A carrier for an electric heating element substantially as hereinbefore described with reference to the accompanying drawings.

25 16. A method of mounting an electrical heating element to the underside of the base of a liquid heating vessel substantially as hereinbefore described with reference to the accompanying drawings.

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The
Patent
Office

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Claims searched: 1,2,3,10

Examiner: John Cockitt
Date of search: 28 February 1997

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H5H [HAG]

Int Cl (Ed.6): H05B [03/06, 03/30, 03/48, 03/68, 03/70, 03/72, 03/82]; A47J [27/21, 31/54]; F24H [01/10, 01/12]

Other: ONLINE: WPIL

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB1139169A	FISCHER - see figs	1,2,3,10 at least
X	US5422459A	ZIBO - see col4	1,2,3,10 at least
X	US4778977A	BLECKMAN - see fig3 and description	1,2,3,10 at least
X	US3953923A	LAKE - see extruded aluminium body 7	1,2,3,10 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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